KATHMANDU UNIVERSITY
End Semester Examination
June, 2019

Mark scored:

Level : B.E.
Year : IV

Course : COMP 473
Semester: II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date :

SECTION "A"
[20Q. × 0.5 = 10 marks]

Choose and encircle the most appropriate answer.

1. The RE gives none or many instances of an x or y is
   A. (x+y) B. (x+y)* C. (x*+y) D. (xy)*

2. If ∑ = {a, b, c, d, e, f} then number of strings in ∑ of length 4 such that no symbol is used more than once in a string is:
   A. 35 B. 360 C. 49 D. 720

3. Which of the following statements describes inflectional morphology?
   A. Addition of a morpheme to produce a new word but the same lexeme.
   B. Addition of a morpheme to produce a new word and a different lexeme.
   C. Addition of a morpheme to produce the same word but a different lexeme.
   D. None of the above.

4. Morphological parsing is
   A. The process of finding the constituent morphemes in a word
   B. The process of finding the constituent morphemes in a sentence
   C. The process of finding the constituent morphemes in a corpus
   D. All of the above

5. Which of the following statements describes derivational morphology?
   A. Addition of a morpheme to produce a new word but the same lexeme.
   B. Addition of a morpheme to produce a new word and a different lexeme.
   C. Addition of a morpheme to produce the same word but a different lexeme.
   D. None of the above.

6. Which of the following statements best describes the English language?
   A. English has complex morphology and less rigid syntax
   B. English has less complex morphology but more rigid syntax
   C. English has complex morphology and rigid syntax
   D. None of the above

7. Morphotactics is a model of:
   A. Spelling modifications that may occur during affixation
   B. How and which morphemes can be affixed to a stem
   C. All affixes in the English language
   D. Ngrams of affixes and stems

8. The suffix /ing/ is an example of a (an):
   A. phoneme B. auxiliary verb C. morpheme D. pronoun

9. Which of the following is *not* a part of speech?
   A. Noun phrase B. Verb C. Interjection D. Determiner

10. In an HMM, tag transition probabilities measure:
   A. The likelihood of a POS tag given a word
   B. The likelihood of a POS tag given the preceding tag
   C. The likelihood of a word given a POS tag
   D. The likelihood of a POS tag given all preceding tags

11. In an HMM, observation likelihoods measure:
   A. The likelihood of a POS tag given a word
   B. The likelihood of a POS tag given the preceding tag
   C. The likelihood of a word given a POS tag
   D. The likelihood of a POS tag given two preceding tags

12. To complete the likelihood of a sentence using a bigram model, you would:
   A. Calculate the conditional probability of each word given all preceding words in a sentence and multiply the resulting numbers.
   B. Calculate the conditional probability of each word given all preceding words in a sentence and add the resulting numbers.
   C. Calculate the conditional probability of each word in the sentence given the preceding word and multiply the resulting numbers.
   D. Calculate the conditional probability of each word in the sentence given the preceding word and add the resulting numbers.

13. When training a language model, if we use an overly narrow corpus, the probabilities:
   A. Don't reflect the task B. Reflect all possible wordings
   C. Reflect intuition D. Don't generalize

14. N-fold cross-validation is a technique for evaluation that uses:
   A. All data in the corpus for training
   B. 10 % of the data in the corpus for training
   C. 90% of the data in the corpus for training
   D. 50% of the data in the corpus for training

15. In a dependency parse:
A. All nodes are labeled with words
B. Only leaf nodes are labeled with words
C. Only non-terminal nodes are labeled with words
D. No words appear in the tree

16. In an Earley parser, a table is filled. Which of the following does not appear as a table entry?
A. Completed constituents and their location
B. Predicted constituents
C. Word predictions
D. In-progress constituents

17. Which of the following represents the relationship between "finger" and a "hand"?
A. Hyponymy B. Hypernymy C. Meronymy D. Holonymy

18. Which of the following processes deals with designing globally acceptable software?
A. Localization B. Globalization
C. Internationalization D. None of the mentioned

19. Consider the example: "Kathy and Donia bought coffee and donuts. They shared them". Which of the following constraints help in determining the antecedent of *they* and *them*?
A. Number agreement B. Case agreement
C. Gender agreement D. Selectional restrictions

20. In the sentence *Sally sent the book to Florida.* Which thematic role does *the book* play in the sentence?
A. theme B. patient C. stimulus D. instrument

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SECTION "B"
[6Q. × 4 = 24 marks]

Answer *ANY SIX* questions.

1. Define morphology and explain the two central concepts of morphology, namely, "morpheme" and "affix". [4]

2. What is Minimum Edit Distance? Compute the minimum edit distance between "tutor" and "tumour" in terms of the edit operations – insertion, deletion and substitution. [4]

3. What is the difference between a Finite State Automata and Finite State Transducers? What are their respective roles in natural language processing? [4]

4. What is the difference between homonymy and polysemy? Give an example of each that illustrates your point. [4]

5. Explain structural ambiguity. Illustration with examples the structural ambiguities caused by PP attachment and Coordination or the use of conjunctions. [4]

6. The following shows a simple context-free grammar (CFG) for a fragment of English.

S-> NP VP	NP -> DET NOM
VP -> VP PP	NOM -> ADJ NOM
VP -> verb NP	NOM -> NOUN
VP -> verb	PP -> PREP NP
	DET -> the
	ADJ -> big
	ADJ -> yellow
	NOUN -> dog
	VERB -> sat
	PREP -> under
	NOUN -> house

Show the parse tree that this grammar would assign to "The big yellow dog sat under the house." [4]

7. In each of the following sentences, identify the semantic roles selecting from *agent, patient, theme, experiencer, stimulus, goal, recipient, benefactive, source, instrument, location, temporal*. Justify your choice. [4]

a. The company wrote me a letter.

b. Jack opened the door with a paper clip.

c. The river froze during the night.

d. I felt the warmth from the fire.

SECTION "C"

[2 Q. × 8 = 16 marks]

Attempt *ANY TWO* questions

8. What is software localization? Explain the process of internationalization and localization. [2+6]

9. What is syntactic parsing? Distinguish the two approaches of parsing – top-down and bottom up. Give examples of top-down and bottom up parsing methods. [2+4+2]

10. What is Information Retrieval? How do you distinguish between Boolean search and ranked information retrieval? Explain the two metrics "Precision" and "Recall" from the perspective of Information Retrieval. [2+2+4]